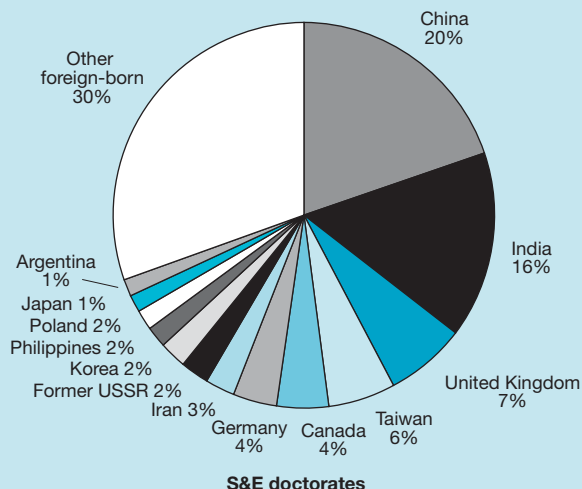
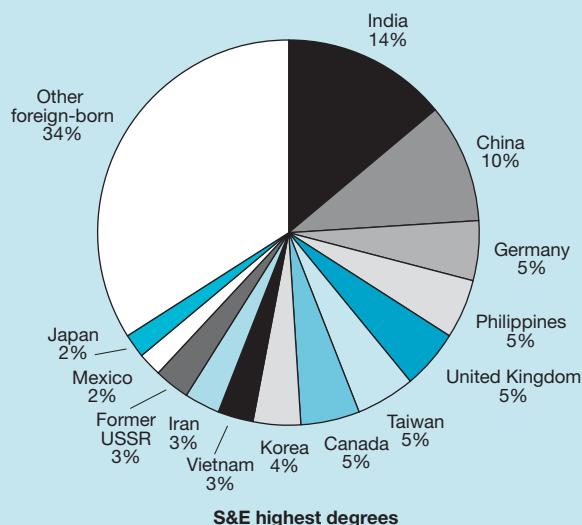


Figure 3-21.
Foreign-born with S&E highest degrees by place of birth: 1999

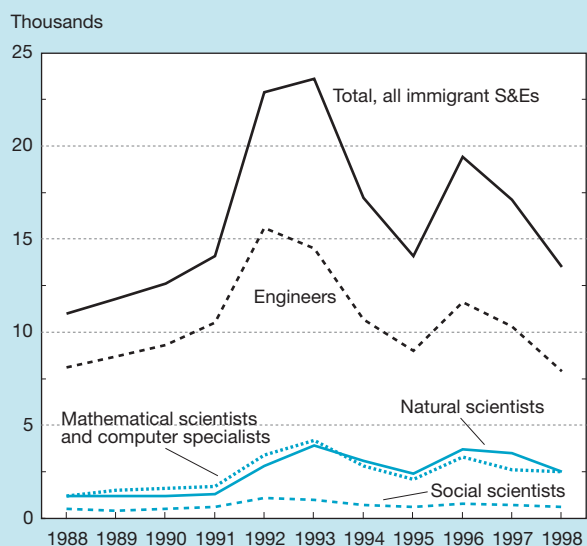


SOURCE: NSF/SRS 1999 Scientists and Engineers Statistical Data System file.

See appendix table 3-51 and 3-52.

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Figure 3-22.
Immigration and naturalization service counts
of permanent visas to S&E occupations: 1988–98



SOURCE: Immigration and Naturalization Service Administration Records.

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over time in the shorter one-to-two-year stay rate of temporary visa S&E doctorate recipients from 40 percent in 1989 to 63 percent in 1999. This increase in the short-term stay rate may reflect increased opportunities for postdocs in the U.S. as well as an increased ability of industry to hire high-skilled workers on temporary visas.

Conclusion and Summary

The U.S. S&E labor market continues to grow both in absolute numbers and in its percentage of the total labor market. Even without the dramatic growth of IT jobs, other areas of S&E employment have had strong growth over the past two decades.

In general, labor market conditions for those with S&E degrees, although always better than for college graduates as a whole, have improved during the 1990s. Labor market conditions for new Ph.D. recipients have also been good by most conventional measures—S&E doctorate-holders are employed and doing work relevant to their training—but the gains have come in the nonacademic sectors (i.e., in most fields, a smaller percentage of recent Ph.D. recipients are obtaining tenure-track positions).

The age structure of the U.S. S&E labor force is likely to produce several major changes in the S&E labor market over the next decade. The number of individuals with S&E degrees reaching traditional retirement ages is expected to triple. Despite this, if S&E degree production remains at current rates, the number of S&E-trained individuals in the labor market will likely continue to grow for some time, albeit at a lower rate, as the number of new graduates continues to exceed the number of retirees.

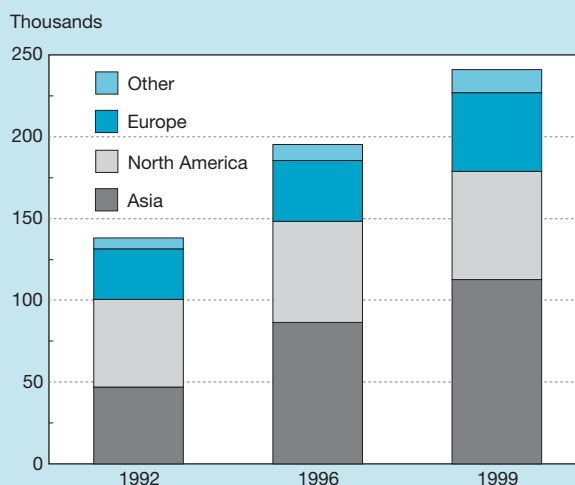
The globalization of the S&E labor force is expanding in two ways: location of S&E employment is becoming more internationally diverse, and S&E workers are becoming more internationally mobile. Although both trends are highlighted by the high-profile international competition for IT workers, every field of science and technology has been affected.

High-Skill Migration to Japan

Visa programs for temporary high-skilled workers have been a focus of recent political debate and legislative change in the United States, Germany, Canada, and many other developed countries. A 1989 revision of Japanese immigration laws made it easier for high-skilled workers to enter Japan with “temporary” visas, which allowed employment and residence for an indefinite period (although the same visa classes are used for work visits that may last for only a few months).

Scott Fuess (Fuess 2001) of the University of Nebraska (Lincoln) and the Institute for the Study of Labor (Bonn) has examined 12 Japanese temporary visa occupation categories associated with high-skilled workers and has written about the growing importance and acceptance of this labor source in Japan. In 1999, 240,936 workers entered Japan in high-skill visa categories—a 75 percent increase since 1992. (See figure 3-23.) For comparison, this is 40 percent of the number of Japanese university graduates entering the labor force each year and nearly double the number of entries to the United States in roughly similar categories (H-1b, L-1, TN, O-1, O-2).

Figure 3-23.
High-skilled worker visas in Japan, entries



SOURCE: Adapted from S. Fuess Jr., *Highly Skilled Workers and Japan: Is There International Mobility?*, University of Nebraska (Lincoln) and Institute for the Study of Labor (Bonn), 2001.

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Foreign Scientists and Engineers on Temporary Work Visas

The use of various forms of temporary work visas by foreign-born scientists has been a subject of policy discussion in recent years. Many newspaper and magazine stories have been written on legislation that temporarily increased the 65,000 annual quota for the H-1b visa program, which provides visas for up to six years for individuals to work in occupations requiring at least a bachelor's degree (or to work as fashion models). Although often thought to be for information technology workers, H-1b visas are used to hire a wide variety of skilled workers.

An H-1b visa is sometimes used to fill a position not considered temporary, for a company may view an H-1b visa as the only way to employ workers waiting long periods for a permanent visa. Because applications for H-1b visas are filed by companies for positions rather than for particular individuals, these applications greatly outnumber the visas actually issued and even the applications by individuals for those visas.

Occupational information on H-1b admissions has not been released, but data are available on the occupations for which companies have been given permission to hire H-1b visa holders. (See text table 3-25.) More than one-half (53.5 percent) of H-1b certifications were for computer-related or electrical engineering positions. Another 4.1 percent were for medical occupations, primarily vari-

Text table 3-25.
October 1999 to February 2000 S&E-related occupations on approved H-1b petitions

Occupation	Occupations	
	Number	Percentage of total petitions
Total	81,262	100.0
Computer related	42,563	53.5
Engineering and architecture ..	10,385	13.1
Education	4,419	5.3
Medical	3,246	4.1
Social sciences	1,963	2.5
Life sciences	1,843	2.3
Mathematical and physical sciences	1,453	1.8
Non-S&E-related occupations	15,390	18.9

SOURCE: Immigration and Naturalization Service administrative data.

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ous types of therapists and technicians but also including medical researchers. Other science and engineering fields garnered 19.7 percent of the certifications; education (including professors) received 5.3 percent, and all other occupations totaled 18.9 percent of 1999 H-1b certifications.

Scientists and engineers may also receive temporary work visas through intracompany transfer visas (L-1 visas), high-skilled worker visas under the North American Free Trade Agreement (TN-1 visas, a program primarily for Canadians now but granting full access for Mexican professionals by 2004), work visas for individuals with outstanding abilities (O-1 visas), and several smaller programs. In addition, there are temporary visas used by researchers, who may also be students (F-1 and J-1 visas), or postdocs and visiting scientists (mostly J-1 visas but often H-1b visas or other categories). Counts of visas issued for each of these categories are shown in text table 3-26. The annual quota of H-1b visas is controlled through issuance of visas to workers rather than through applications from companies. Anecdotally, some firms that expect to hire multiple workers on H-1b visas seek permission for many positions, and this affects the distribution of occupations outlined in text table 3-25.

Text table 3-26.

FY 1996 temporary visas issued in major categories likely to include scientists and engineers

Category	Issued
Work visa	
H-1b (specialty occupations requiring bachelor's equivalent)	58,327
L-1 (intracompany transfers)	32,098
TN (NAFTA visa for professionals)	29,252
O-1 (people of extraordinary ability)	2,765
O-2 (workers assisting O-1)	1,594
Student/exchange visa	
F-1 (students)	241,003
J-1 (exchange visitors)	171,164

SOURCE: Immigration and Naturalization Service administrative data.

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Text table 3-27.

Recipients of 1992–93 doctorates with temporary visas at time of degree who remained in United States: 1994–97

S&E field	Temporary residents	Percent in U.S. in:			
		1994	1995	1996	1997
Total	16,391	48	51	52	53
Physical sciences and mathematics ...	4,821	55	59	60	61
Life sciences	3,765	48	51	53	54
Social sciences	2,278	29	31	32	32
Engineering	5,527	49	53	53	54

SOURCE: M. Finn, *Stay Rates of Foreign Doctorate Recipients from U.S. Universities* (Oak Ridge, TN: Oak Ridge Institute for Science and Engineering, 2000).

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